The relationship of a nation to the land and the resources that sustain it could be said to be written in chapters. Chapters begin, take sudden twists and turns as needs change, and then give way to the chapters which follow.

If the chapters are about resource stewardship and wise land use, there can be many of them, and each can be more exciting and varied than the last.

If they are about resource abuse and neglect, however, the plot is one of dwindling resource productivity and with it, diminishing national options.

My purpose here is to discuss the chapters that lie ahead for agricultural and forest resources of the United States. I will talk about the trends in their use and management through the year 2030; the economic, other social, and environmental factors which will help shape those trends; and the role of government in influencing their development.

I subscribe to the "Wise Economist's First Principle of Predicting:"

"Always predict far into the future. If you happen to be right, you can always remind people. If you're wrong, no one will ever remember."

I am not going to lay out, with profound wisdom and a great deal of certainty, the way the future will unfold for our nation's use and management of its natural resources. None of us has the wisdom or the foresight to do that.

So I will explore the changes which have marked past chapters in the interaction between our people and resources, and which will probably shape our future direction.

Our nation's 200-year history is recorded in a rich variety of chapters on resource use and management. Each has been tied to the manner of our people's existence--the quality of their lives--and the character of their needs and wants.

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Remarks of M. Rupert Cutler, Assistant Secretary for Natural Resources and Environment, to the Federal Executive Development Program, Charleston, S.C. on May 20, 1980.

There was a chapter of resource development and exploration of an expanding frontier. Early arrivals to eastern North America found a wilderness of great forests mixed with small areas of marsh, meadow, swamp, and occasional clearings for Indian villages.

To the American colonists, the forest was both an impediment to be removed as rapidly as possible to make way for farms and villages and a storehouse of vital materials. The land was cleared. Fur, fish, farms, and forests provided the economic base for the development of the American colonies. An agricultural society displaced one of hunter-gatherers.

By the time of the Revolutionary War, a hundred-mile wide area had been opened up from southern Maine to Georgia; half to three-quarters of it was cleared.

Next in our national history of resource use was a chapter of resource exploitation and national growth, as we discovered and tapped new resources to meet the needs of an expanding economy.

Land was cheap. The forests seemed to be everywhere. The Louisiana Purchase and Jefferson's promotion of agriculture encouraged westward expansion. By the late 1830's thousands of settlers were reaching Ohio and Michigan and moving south to Tennessee and Alabama.

The population grew from 4 million in 1790 to 5 million 10 years later. It doubled by the early 1820's, then doubled again by 1850.

Cotton production increased sixty-fold from 1790 to 1815. The central prairies and plains were opened to farming. The sawmill industry developed and spread.

The Homestead Act in 1862, the Desert Land Act in 1877, and other laws opened the west for resource development, most of it agricultural.

Exploitation of the nation's resources was gradual at first, but gained momentum. With cheap land, better transportation as the railroads were extended, developments in farm machinery, and rapidly increasing markets, the United States encountered its first big boom in natural resource productivity and value.

But not without cost. The wheat acreage in the Great Plains was expanded far beyond the sustainable capacity of the land. Farming systems then in use failed to maintain the basic soil resources.

By 1830, the forests of New England had been cut over, those of New York by 1850, and Pennsylvania's shortly after the Civil War.

It was about this time, when the Civil War had ended, the frontier had closed and the era of cheap and readily available land had come to an end, that the American people began another chapter in their natural resource history--one of "conservation discovered."

Whether it was prompted by the rapid pace of logging, widespread destruction by forest fire, extensive soil erosion, or as some have suggested, the efforts of a wily propagandist, Americans came to realize the limitations of the forests and the importance of the soil. And they began to establish the federal agencies and other institutions to manage those resources wisely.

This chapter began with forest conservation. The American Forestry Association was founded in 1875 by citizens concerned about the nation's forests. In the next quarter-century, much of our paramount conservation policy was established:

- The first national park--Yellowstone--was established in 1872.
- A rider to an appropriations act in 1876 appropriated $2,000 for the employment of an expert "to study and report upon forest conditions." This was the beginning of federal forestry programs.
- New York State, in 1894, amended its constitution to protect the watershed of the upper Hudson River by setting aside state-owned lands in the Adirondack and Catskill regions to be "forever wild."
- In 1891, Congress authorized the President to "set apart and reserve public land bearing forests," and in 1897, to manage those reserves. Those forest reserves were the predecessors of a national forest system which now embraces 187 million acres in 43 states and Puerto Rico.
- In 1905, the Forest Service was established in the Department of Agriculture, and given the responsibility for managing those national forests.

It was another 30 years, however, before the nation's conservation consciousness extended to the soil resource.

The amount of land devoted to agriculture expanded rapidly during and after World War I peaking in 1930. That year there were 6.5 million farms on nearly a billion acres, supporting a farm population of 32.5 million people.

During this time, soil erosion was widely accepted as an inherent part of farming, though the nation was losing an average of 1.5 billion tons of soil to erosion each year.

In cooperation with state agriculture experiment stations, the federal government began to study the problem at 10 erosion research stations. But just as the first erosion experiments were getting underway, the most severe drought in the nation's history, coupled with a catastrophic economic depression, made the erosion problem much worse.

In March 1933, the Civilian Conservation Corps was established to attack the dual problems of unemployment and resource loss.

In August 1933, the Soil Erosion Service was created in the Department of the Interior and given funds for erosion control projects.

And after the first of the great dust storms in 1934 picked up pulverized topsoil from Texas, New Mexico, Colorado, Oklahoma, and Kansas and dumped it as far as 300 miles into the Atlantic Ocean, Congress passed the Soil Conservation Act. This made erosion control and soil conservation a permanent national policy, and led to the creation of the Soil Conservation Service in the Department of Agriculture.

Since then, the nation has progressed through a new chapter--one of restored resource productivity, applied technology, and growing demands upon the resource base.

We have spent several generations correcting the resource abuses of the past. On both private and public lands, we have planted trees, tied down the soil, brought water to once dry lands, and recovered the productivity of millions of acres. With revolutionary advances in conservation practices based upon progressive federal, state, and university research programs, we have turned the corner on resource degradation.

After World War II, the technological advances in equipment and materials made during the war were used to improve machinery and chemicals for agriculture. New commercial fertilizers, chemicals for disease and weed control, better conservation practices, prepared livestock feeds, and a host of other products have tremendously affected both farming and forestry.

The increase in agricultural productivity was dramatic. In producing wheat on the Great Plains, for example, one person could now do work that once required more than thirty. After 1950, agricultural productivity increased at a rate more than triple that in other economic sectors.

This growth has had a great influence on both on the structure of American agriculture and the character of the nation.

Farms have become fewer in number but larger in size, to the point that, in 1974, slightly less than 10 percent of the farms accounted for one-third of the land harvested in the United States. Capital goods--tractors, chemicals, and other materials--have substituted for labor. There has been a great out-migration of labor from agriculture to industry.

In short, over the past 30 years, the nation has been gradually transformed from a rural, agriculturally based society to one which is urban and industrially based.

Forest productivity also has grown. The net annual growth of softwood timber, which is the product used most extensively in housing, paper, and plywood, increased by nearly 60 percent between 1952 and 1977. At the same time, harvest levels increased by 31 percent. This occurred despite a 2 1/2 percent loss in the amount of commercially available productive forest land in the nation.

This forest productivity was further stretched by advances in harvesting and processing technology. George Weyerhaeuser has stated that if 1948 wood utilization levels had been used to meet 1973 demand, 49 percent more forest land would have had to be harvested to supply the U.S. domestic market alone.

And through this more recent chapter, the demands on agricultural and forest resources have grown. Americans want more food, more fiber, and a variety of other natural resource products as well.

The greatest change has been the diversification of demands upon the nation's forests. Recreation, wildlife, water, wilderness, and other forest-associated values have become major factors in forest land use, to the point where there are often very difficult and earnest conflicts over how forest lands will be managed and used--particularly those that are publicly owned.

The American people are placing a premium value on the forest and its products. They are again realizing the tremendous potential of our forests for meeting long-range national needs--for serving as a source of energy, or as a substitute for less energy-efficient materials; for helping to provide employment, particularly for young people; and for providing a clean, healthy, and aesthetically pleasing environment.

With that past as preface, let me now turn to the future--to the chapters ahead in the interaction between our people and their resources.

In 1974, Congress enacted the Forest and Rangeland Renewable Resources Planning Act, or RPA, to provide a framework for comprehensive, long-range, and continuous planning for the nation's forest and rangeland resources.

Three years later, RPA was complemented by RCA, or the Soil and Water Resources Conservation Act of 1977. RCA establishes a similar planning framework for the nation's non-federal soil and water resources.

Both the RPA and the RCA planning processes involve two distinct but related steps:

First, a comprehensive inventory and analysis of resource conditions, present and future uses, projected supplies and demands, and opportunities for improving the yield of goods and services. In RPA planning, this is called the assessment; in RCA planning it's an appraisal. And if you put the two together you have one thick document that represents the most comprehensive and thorough evaluation yet done of the nation's agricultural and forest resource situation and outlook. The trends I will discuss shortly are gleaned from the RPA assessment and draft RCA appraisal.

Second, this factual analysis of the resource situation is then used to plan long-term management strategies for the Forest Service, Soil Conservation Service, and several other Department of Agriculture agencies.

In both RPA and RCA planning processes, this is called the program. And it is used by the Department of Agriculture, the Office of Management and Budget, and the Congress to plan and budget resource management programs.

The RPA assessment and RCA appraisal will also be used for long-term resource planning by other federal agencies, as well as state, local, and private organizations. In his 1979 environmental message, President Carter directed the Bureau of Land Management to use the RPA assessment as the basis for its own program for the 480 million acres it manages.

The availability of ample agricultural and forest resources is basic to continuing our current standard of living. But until recently, there has not been much concern about the long-term capacity of our resources to meet our national wants and needs. Only within the last decade have we come to realize that the United States has limited amounts of land and water.

What will happen to these basic resources as our own population grows and much of the rest of the world looks to us as its breadbasket? Will we have enough land to grow our crops, graze our livestock and raise our trees? Are we in danger of seeing our productive capacity erode along with the soil? Are we cutting more trees than we are growing? How much good farm and forest land will be lost to urbanization and highway construction? Can we afford to lose more wetlands, more fish and wildlife habitat?

These are some of the basic questions we have been considering through the RPA and RCA planning processes.

In the last 50 years, the population of the United States has increased by about 97 million people to the 1979 level of 220 million. And it continues to grow rapidly. The Bureau of Census medium projection is that the U.S population will grow by 80 million over the next 50 years, to total about 300 million Americans by the year 2030.

Between 1929 and 1978--approximately the last 50 years--the Gross National Product quadrupled in constant dollars. The Bureau of Economic Analysis projects that the GNP will double in the next 20 years, and by 2030 will be 3.7 times that of 1978. Over the same period of time, disposable personal income is projected to triple.

This growth means that the nation is faced not only with an additional 80 million people to be fed, sheltered, and provided the necessities of life, but also the demands of 300 million people with much greater purchasing power than today's population.

We are living in a society with unprecedented opportunity, with more leisure time, more disposable income, greater mobility, and longer life spans than ever before. That has been translated into growing pressure upon our agricultural and forest resources.

For example, the number of camping households has roughly quadrupled since the early 1960's and now totals around 15 million. Timber consumption has increased from a level of 11.5 billion cubic feet to 13.7 billion cubic feet in 1977.

And we project that the demands upon these resources will continue to grow rapidly in the decades ahead.

Between now and the year 2030:

- o The demand for downhill skiing will more than triple;
- o water consumption will increase by 60 percent;
- o demand for timber, and for dispersed camping, will more than double;
- o and the demand for range grazing will rise by 40 percent.

The projected growth in demand for these and other land values is substantial.

On the other hand, our capacity to meet those demands, at current rates of investment and levels of management, increases at a slower rate. Our projections indicate that we will continue to lose the productive capacity of our resources:

- o Soil erosion will continue to be a problem. Producers will require some type of financial assistance to do a good job of protecting our soil and water resources.
- o Prime farmland will continue to be converted to urban uses at the current rate of 1 million acres a year.
- o Our current reserve of potential cropland--about 127 million acres--will be depleted, removing any "safety factor" in case of war or natural disaster.
- o And the rate of technological progress in agriculture, which spurred past increases in productivity, will slow down.

Thus, the United States is faced with a growing imbalance between the demands upon our agricultural and forest resources, and the supply necessary to satisfy them.

This imbalance has some important implications. For example, the projected imbalance between demand and supply for timber means that the nation is faced with the prospect of rapid and continuing increases in the prices of timber products, relative to the general price level and to prices of most competing materials such as steel, aluminum, and plastics. This, in turn, means that the economy must increase its dependence upon imports of timber products and substitute materials.

It also means increased cost of products, such as houses and furniture, made wholly or in part from wood; rising environmental costs resulting from the mining, industrial processing, and power generation associated with the increased use of substitute materials; and an acceleration in the rate with which we consume nonrenewable resources.

The outlook for forage and water is similar in many respects--higher costs, with the associated impacts on the economy, the environment, and society.

For users of wildlife, fish, and outdoor recreation resources, the outlook will mean intensified competition for the available resources. This may well lead to shrinking populations of wildlife and fish, and fewer and less satisfying opportunities for outdoor recreation.

Overall, this suggests a gradual deterioration in the quality of life which the nation has come to appreciate and expect. That's not a very pretty outlook.

We must recognize the global dimension to the demands upon U.S. agricultural and forest resources. The management, protection, and use of those resources must be considered in relation to world resource conditions, and the implications for U.S. natural resources attributable to our nation's position in the global community.

In many of the developing nations, the natural resource base has been depleted by the human struggle for survival and growth. Pasturelands have been degraded through centuries of overgrazing. Third World population growth has prompted farmers to put marginal cropland to the plow. Forests are cleared for fuel, and shifting agriculture leaves once-fertile soils without nutrients, and subject to erosion and desertification. The United Nations estimates that 3.6 billion hectares, supporting 250 million people, are subject to this resource depletion.

In the developed nations, the extensive use of energy and raw materials has often burdened the environment. Once viewed as the cost of rapid progress and economic growth, these environmental costs have now become major issues.

But it has taken the evolving energy situation, coupled with an occasional food shortage and shortages of other materials, to arouse worldwide interest in the problems of resource scarcity.

A recent report by the Presidential Commission on World Hunger states that unless the United States and other developed countries act now to increase long-range agricultural productivity, a global food crisis, worse than the present energy situation, is likely within the next 20 years.

The report warns that two successive years of bad harvests in any of the major grain producing nations could cause "widespread famine and political disorder" in poor countries, and "would severely disrupt a fragile world economy already weakened by energy shortages and rampant inflation." Other organizations, such as the United Nations, Council on Environmental Quality, and World Bank, have issued similar warnings.

Our natural resource base in the United States is tremendously rich and diverse. It can be a strong asset, both for meeting our domestic food and fiber requirements, and for buffering the growth in global demand.

However, the major adjustments that are needed to fulfill this duel role will challenge human ingenuity and the capacity of human beings to adapt to an increasingly complex relationship involving their needs, the materials which fulfill them, and the quality of their environment.

Our nation has been built on the premise of natural resource abundance and availability. By every conventional measure, our modern society is a model of success. More goods have been produced and sold then ever before. More people have been working. Our standard of living has never been higher. Yet our confidence in the premise that fueled this progress has been deeply shaken by events in the last decade.

Can we forget the gas lines of 1973 and 1979? Our nation's proven reserves of oil have declined more than 25 percent since 1970; natural gas reserves by nearly a third.

A generation ago we sent more oil out of the country than we brought in. Now we import nearly half the oil we use, at a cost we can ill afford, and in amounts we can scarcely justify as responsible energy consumers.

On other resource fronts, we are striving to develop a long term balance between our burgeoning uses of water and the rate of groundwater recharge. But we face shortages of irrigation water in the interim, with further implications for the availability and cost of food.

We are still losing over 4 billion tons of topsoil annually, a loss of a precious resource that threatens the continued productivity of both agriculture and forestry.

Many of the chemical tools that have allowed us to expand food and fiber yields are now suspect for environmental reasons.

Our annual losses of prime farmland and productive wetlands, through their conversion to other uses, point to reduced agricultural efficiency and disappearance of vital fish and wildlife habitat.

And recent projections have indicated that our country's yearly demands for wood may outstrip supply by the year 2000--only 20 years from now--and that timber product prices are expected to rise substantially as a result.

Every generation is one of transition, but ours portends bigger changes in the global order than has been the case in several centuries. We are a society that has begun a wrenching transition from an era of resource availability to one of resource scarcity and increasing cost.

We are approaching difficult and critical choices about the future rate and direction of our progress, the manner by which it will be advanced, and the style and quality of our living.

Since early in the seventies, we have been in the midst of a new chapter in the interaction between our people and their resources--one of "conservation rediscovered"--as we make the slow but necessary transition toward a society in much better balance with the capacity of the resources which sustain it--in other words, a society in command of its future.

I believe that the quality of life which future generations can enjoy will depend primarily upon how well we manage and use our agricultural and forest resources in the years just ahead. We have the opportunity to influence the course of our development--to engineer our future environment--through the choices we make.

Not only in the Department of Agriculture, but also in the Departments of Commerce, Education, Defense, Health and Human Resources, Interior--in any department, agency, or organization, whether public or private--we are daily confronted with making choices on the shape of our future environment.

The process of making those choices is one you are familiar with.

And the fact that you are here today can be taken as evidence that you probably are quite good at it.

So in a few minutes, I would like your help in drawing up a few choices on how some of the nation's forest and agricultural resources should be managed or used.

Before we do that, however, I would like to make a few basic observations on some of the general factors we must consider in making those choices:

First, government policy and action are the most important determinants of how well the nation's agricultural and forest resources are managed. These policies affect tax regulations, environmental standards, and other requirements that help shape resource management programs.

But these government policies are by no means the only determinants of how well these resources are managed.

Two thirds of the agricultural and forest lands in the United States are privately owned. Within the limits of existing law and institutions, the landowners still have considerable freedom to choose how those lands will be managed and used.

The states have major authorities for fish and wildlife management, land use, regulation of water rights, and other actions which give them leverage over resource management decisions--often over federal resource management decisions within their boundaries.

And colleges and universities shape resource management programs by providing new technology and educated landowners and resource managers.

But in the context of mankind's long record of interaction with the changing environment, no institution is yet sufficiently responsible or responsive. Our collective efforts to date, to engineer our future have been halting, fumbling, and erratic. Often they have been inadequately organized or directed.

Second, the choices we must make have far-reaching implications.

Five critical resource systems--food, water, human energy, non-human energy, and minerals--have been woven into an intricate tapestry of choice. For example:

- o Food to produce human energy cannot be grown without water, and
- o electrical energy cannot be generated without wire of copper, aluminum, or some other metal, which human energy must mine.

A decision affecting one resource system will secondarily affect the others, and determine which people in which parts of the world are hungry, cold, or out of work. So resource management choices must be made in a broad context of their impact on the economy, on rural life, or other considerations in the entire realm of policy.

Third, decisions in this larger realm, in turn, affect agricultural and forest resource management.

A year ago, for example, President Carter authorized the Air Force to develop a new intercontinental ballistic missile known as the MX.

The preferred site for the system is in the rural desert basin area in Nevada and Utah, affecting an area of about 7,000 square miles. That has implications for agricultural, range, and forest resources in the area as well as the rural economy and life style, primarily through the project's need for water and energy.

So agricultural and forest resource management decisions must be related to many other decisions which may, at first glance, seem unconnected. As the explorer, conservationist, and naturalist John Muir once noted, "When we try to pick out anything by itself, we find it hitched to everything else in the universe."

Fourth, the American public has a great deal of knowledge and concern about agricultural and forest resource management and conservation choices, and expects to be involved in making them.

That was made evident by the results of a public opinion survey conducted by Louis Harris and Associates, which the Soil Conservation Service contracted for as part of its RCA planning. Let me highlight some of the results, based upon responses from more than 7,000 people:

(1) More than 8 out of 10 Americans believe that conservation is important for the country.

(2) Half of all Americans consider the misuse of soil and water resources, and the loss of farmland to other uses, to be serious problems.

(3) By 7 to 1, Americans accept federal action to protect farmland from erosion as a proper role for government. They see conservation as a joint public and private responsibility which should be shared fairly between government and farmer or other landowner.

(4) The American people prefer allocating a greater share of scarce soil and water resources to agriculture--specifically to food production--than to the competing uses for housing, industries, recreation, or even energy.

(5) More than three-fourths of the American people feel that we have not reached the point in soil and water conservation efforts where we should be more concerned about holding down costs than completing the work that remains to be done.

Fifth, our knowledge of a rapidly changing world is incomplete and imperfect. The unknown, unexpected, and unanticipated always will be a part of our universe.

We know much more now than we have ever known, the result of a searching and progressive research program and expanding economy.

And we are learning more, at a faster rate. Ninety percent of all scientists who ever lived, live today.

And their work is being rapidly translated into hundreds of insights and imaginative new technologies--into pocket calculators, digital watches, solar generators, even into new forms of life.

But we are confronted with an accelerating rate of change. Alvin Toffler dramatizes this with an account of the progress in transportation:

- In 6000 B.C. the fastest transportation available to man over long distances was the camel caravan, averaging eight miles per hour.
- It was not until about 1600 B.C., when the chariot was invented, that the maximum speed was raised to roughly 20 miles per hour.
- Nearly 3500 years later, when the first mail coach began operating in England in 1784, it averaged even less--10 miles per hour.
- The first steam locomotive, introduced in 1825, could muster a top speed of only 13 miles per hour.
- It was probably not until the 1880's that man, with the help of a more advanced steamed locomotive, managed to reach a speed of 100 miles per hour.
- It took only 58 years, however, to quadruple that record when airborne man exceeded 400 miles per hour.
- In another 20 years, that limit was doubled again.
- By the late 1960's, rocket planes like the X-1 approached speeds of 4,000 miles per hour.
- And men in space capsules were circling the Earth at 18,000 miles per hour.

Plotted on a graph, Toffler notes, the line representing progress in the past generation would leap vertically off the page.

It is very difficult for any institution to be sufficiently flexible to adapt quickly to the changing global situation, or even to keep abreast of how rapidly things are changing. So we often act on an obsolete situation, and on the basis of incomplete information. How can we do better?

These are the basic elements of choice:

A government that is influential but not sufficiently responsible and responsive.

Far-reaching factors to be considered.

Far-reaching implications to each of our decisions.

And imperfect and incomplete knowledge of a rapidly changing world.

We are all challenged to use them creatively to improve our institutional competence in engineering our future environments.

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